SAPC 12095
Copy 2 of 6
14 February 1957

MEMORANDUM FOR: Contracting Officer

SUBJECT : System One Modification Progress Report

I. Antennas*

A. For the region 1 to 8 kmc/s, several antenna plans have been tested and two are satisfactory. The satisfactory plans are:

(1) The Stanford Plan covers the entire range with one antenna, a "bent bow-tie" in the R-W 11½" parabolic reflector. This antenna on the average is about 6 db poorer than a state of the art spot frequency antenna and throughout the range of 1 to 8 kmc/s varies from 2 to 10 db poorer than a state of the art spot frequency antenna.

(2) The ESO Plan covers the range with one 16" aluminum reflector using a set of "T-fed slots" at the focal point. The mounting brackets now installed would be used with these antennas. Three of the slots are used, one for 1-2 kmc/s, one for 2-4 kmc/s and the third for 4-8 kmc/s. This antenna has a little better efficiency but has the disadvantage that the slots must be changed if the band to be covered is to change. Since filters must be changed each time the band covered is to be changed, the changing of the filter and slot can be done in one operation. This antenna is about 4 db on the average poorer than the state of the art and varies from 0 to 8 db poorer over the range.

RECOMMENDATIONS: Of these two plans, the ESO Plan would give the best performance. The Stanford Plan would give somewhat less performance, but would be less involved and faster to place in effect. Therefore, due to the urgency of time, it is recommended that the Stanford Plan be adopted and that "bent bow-tie" feed units be produced by R-W and supplied to the field as a modification to the existing dishes.

B. Coverage of the 150-1000 mc/s range is being attempted by the use of the R-W double spiral antennas. Their 9 3/4" spiral has been tested and found to give good coverage over the range from 400-1500 mc/s. The design of the larger 17" spiral covering the 150-1000 mc/s range has recently been completed. Two of these antennas have been ordered for test purposes. These antennas are expected to be on hand for testing on 6 or 7 February 1957.

---

*Although this work is not completed, we can be 90% sure of the conclusions stated herein. The "bent bow-tie" antenna is undergoing further tests and an attempt is being made to improve its performance. The R-W 17" double spiral antennas have not been received and therefore have not been completely evaluated.

File
A-187

RECOMMENDATIONS: It is recommended that the R-W spiral antennas be used to cover the 150-1000 mc/s band. If the 17" spiral should prove too unusable due to its large size, it is recommended that a scaled-down model be used to cover this range.

C. Two antennas have been tested for the 60-100 mc/s region. Both are satisfactory to cover any 10 mc/s section within the 60-100 mc/s band. The changing of the antennas in this 10 mc/s region is a "screwdriver operation". One is the commercial 75 mc/s aircraft marker beacon antenna which can be flush mounted. The other which was developed by [redacted] of Washington, D. C. uses the same principle - "a tuned, horizontal stub" and mounts external to the aircraft skin. Both are state of the art antennas for low drag design. 25X1A

RECOMMENDATIONS: Since both are easily obtained that they be procured as needed. We now have four of the [redacted] antennas with four more on order and nine of the flush mounted 75 mc/s beacon antennas. In summary, the above recommendation would give us System One antennas as drawn in this chart: 25X1A

25X1A

60 mc/s 100 mc/s	150 mc/s	1000 mc/s	8000 mc/s 15,000 mc/s
[redacted] or Marker Beacon	None (System 3 Covers)	One or at most two "double spirals"	"T-fed slots" or "bent bow-tie" in one reflector	R-W X-band antenna

II. Filters and Crystal Holders

The above antennas require filters so that their wide coverage can be limited according to a given operational need. Filters for System Five and [redacted] already exist and are usable on System One. Our tests show that the filters produced by Micro-labs at frequencies above 500 mc/s and those by Micro-phase at frequencies below 1000 mc/s are very good. The crystal holders and crystals as supplied for System Five from Micro-labs via Hallicrafters are the most sensitive known to us. 25X1A

RECOMMENDATIONS: That filters and crystal holders of the following types be obtained by R-W in quantities of twelve each and fitted into the installations:

150 high pass - Microphase
250 low pass - Microphase
250 high pass - Microphase
500 low pass - Microphase
500 high pass - Microphase
700 low pass - Microlabs
1000 low pass - Microlabs
1000 high pass - Microlabs
2000 low pass - Microlabs
2000 high pass - Microlabs
4000 low pass - Microlabs
4000 high pass - Microlabs
8000 low pass - Microlabs

150-300 Crystal Holders - Microlabs
250-500 Crystal Holders - Microlabs
500-1000 Crystal Holders - Microlabs
1000-2000 Crystal Holders - Microlabs
2000-4000 Crystal Holders - Microlabs
4000-8000 Crystal Holders - Microlabs

25X1A

III. Information Amplifiers (Reference: 25X1A [redacted] (IN 12578) dtd 18 Jan 57)

[redacted] is attempting to develop a field modification that will eliminate the unstability caused by the pulse stretcher, the noise cuased by the power supply, and bring the sensitivity from -25 dbm to as close to the present state of the art (-55 dbm) as is practical (-50 dbm is the objective). [redacted] reports that he has been successful in obtaining a tangential sensitivity of -45 to -50 dbm and that the response only drops 2 db at 50 cycles/sec. To achieve this sensitivity, it has been necessary to build a new enlarged System One power supply. Because of its increased sensitivity, the newly designed information amplifier has been found to be microphonic. Special shock mounting is being designed in an attempt to eliminate this problem. R-W is making plans for field testing this unit on 6 February. 25X1A

25X1A9a

RECOMMENDATION: [redacted] will follow [redacted] work until [redacted]' return in mid-February. If a satisfactory solution has not been reached, Jim will develop a solution either here or at [redacted] 25X1A9a

25X1A

[redacted] 25X1A9a

ELINT Staff Officer

25X1A9a

Distribution:
Copies 1 and 2 - [redacted]
3 - [redacted]
4 and 5 - ESO
6 - Project Chron